

WHAT IS CLAIMED IS:

1. A pattern inspection apparatus comprising:
 - a stage on which a plate to be inspected including a pattern formed on the plate is laid;
 - 5 a light source which irradiates the plate to be inspected with light;
 - a photoelectric device which photoelectrically converts the optical image of the pattern;
 - 10 a detected pattern data generator which generates detected pattern data regarding the pattern based on a signal obtained by the photoelectric device;
 - a reference pattern data generator which generates reference pattern data from designed data regarding the pattern, or stores the detected pattern data obtained by the photoelectric device;
 - 15 a comparator which compares the detected pattern data with the reference pattern data;
 - a light intensity sensor which detects a light intensity of the light;
 - 20 a barometric pressure sensor which detects a barometric pressure in the pattern inspection apparatus;
 - a status detector which senses that at least one of the light intensity and the barometric pressure deviates from a predetermined range;
 - 25 a data memory in which the detected pattern data and the reference pattern data regarding the detected

pattern data at the same time as a time when the status detector detects that the at least one of the light intensity and the barometric pressure deviate from the predetermined ranges are stored in synchronization with 5 position data on the plate to be inspected and a detected value of the at least one of the light intensity and the barometric pressure deviating from the predetermined range; and

10 an output device which outputs the detected pattern data, the reference pattern data, and the detected value of the at least one of the light intensity and the barometric pressure stored in the data memory.

15 2. The pattern inspection apparatus according to claim 1, further comprising a focus sensor which detects a focus abnormal status of the illumination and imaging optics.

20 3. The pattern inspection apparatus according to claim 1, further comprising a vibration sensor which detects vibration of the stage for the plate to be inspected.

25 4. The pattern inspection apparatus according to claim 1, further comprising: a signal intensity profile analysis part which analyzes a signal intensity profile of the detected pattern data at an abnormal status time; a re-inspection control part which re-inspects at least a part on the plate to be inspected based on

an analysis result of the signal intensity profile analysis part; and an abnormal status notification part which notifies the analysis result.

5. The pattern inspection apparatus according to
5 claim 4, wherein the signal intensity profile analysis part compares signal gradients of horizontal and vertical direction components of a pattern edge part of the detected pattern data with a first predetermined standard value, and an intensity and fluctuation of
10 a signal of a pattern bright part with a second predetermined standard value.

6. The pattern inspection apparatus according to
claim 5, wherein the signal intensity profile analysis part compares the signal gradients of the horizontal and vertical directions with respect to the pattern edge part of the detected pattern data, and judges that vibration of the stage is generated, when a difference between the signal gradients is not less than the first predetermined standard value.
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20. The pattern inspection apparatus according to
claim 5, wherein the signal intensity profile analysis part compares the signal gradients of different diagonal directions of a pattern corner part of the detected pattern data, and judges that vibration of the stage is generated, when a difference between the signal gradients is not less than the predetermined
25 standard value.

8. The pattern inspection apparatus according to
claim 1, wherein the comparator stores the detected
pattern data and the reference pattern data regarding
the detected pattern data the predetermined number of
5 times, when the same abnormal status is detected the
predetermined number of times in a first predetermined
time, and stops storage into the data memory with
respect to the same abnormal status until a second
predetermined time elapses.

10 9. A pattern inspection apparatus comprising:
a stage on which a plate to be inspected including
a pattern formed on the plate is laid;
an electron gun which generates electron beams;
an electron optics which irradiates the plate to
15 be inspected with the electron beams;
a secondary electron detector which detects
secondary electrons generated from the plate to be
inspected;
a detected pattern data generator which generates
20 detected pattern data regarding the pattern based on
a signal obtained by the secondary electron detector;
a reference pattern data generator which generates
reference pattern data from designed data concerning
the pattern, or stores the detected pattern data
25 obtained by the photoelectric device;
a comparator which compares the detected pattern
data with the reference pattern data;

a dose sensor which detects a dose of the electron beams;

5 a barometric pressure sensor which detects a barometric pressure in the pattern inspection apparatus;

a status detector which detects that at least one of the dose of the electron beams and the barometric pressure deviates from a predetermined range;

10 a data memory in which the detected pattern data and the reference pattern data regarding the detected pattern data at the same time as a time when the status detector detects that the at least one of the dose of the electron beams and the barometric pressure deviates from the predetermined range are stored in synchronization with position data on the plate to be inspected and the detected value of the at least one of the dose of the electron beams and the barometric pressure deviating from the predetermined range; and

15 an output device which outputs the detected pattern data, the reference pattern data, and the detected value of the at least one of the dose of the electron beams and the barometric pressure stored in the data memory.

20 10. The pattern inspection apparatus according to claim 9, further comprising a focus sensor which detects a focus abnormal status of the electron optics.

25 11. The pattern inspection apparatus according to

claim 9, further comprising a vibration sensor which detects vibration of the stage for the plate to be inspected.

12. The pattern inspection apparatus according to
5 claim 9, further comprising: a signal intensity profile analysis part which analyzes a signal intensity profile of the detected pattern data at an abnormal status time; a re-inspection control part which controls to re-inspect at least a part on the plate to be inspected
10 based on an analysis result of the profile analysis part; and an abnormal status notification part which notifies the analysis result.

13. The pattern inspection apparatus according to
claim 12, wherein the profile analysis part compares
15 signal gradients of horizontal and vertical direction components of a pattern edge part of the detected pattern data with a first predetermined standard value, and an intensity and fluctuation of a signal of a pattern bright part with a second predetermined
20 standard value.

14. The pattern inspection apparatus according to
claim 13, wherein the profile analysis part compares
the signal gradients of the horizontal and vertical
directions with respect to the pattern edge part of the
25 detected pattern data, and judges that vibration of the stage is generated, when a difference between the signal gradients is not less than the first

predetermined standard value.

15. The pattern inspection apparatus according to
claim 13, wherein the signal intensity profile analysis
part compares the signal gradients of different
5 diagonal directions of a pattern corner part of the
detected pattern data, and judges that vibration of the
stage is generated, when a difference between the
signal gradients is not less than the first
predetermined standard value.

10 16. The pattern inspection apparatus according to
claim 9, wherein the comparator stores the detected
pattern data and the reference pattern data regarding
the detected pattern data the predetermined number of
times, when the same abnormal status is detected the
15 predetermined number of times in a first predetermined
time, and stops storage into the data memory with
respect to the same abnormal status until a second
predetermined time elapses.

20 17. The pattern inspection apparatus according to
claim 9, further comprising a magnetic field sensor
which senses a magnetic field in the pattern inspection
apparatus.